their solidity and durability if used in the lower part of a wall to be built in Dover Bay?—I attach the greatest importance to concrete in its use as a whole, as a mass. The larger you can make the foundation of a building as a whole, the more safe a building is, as a snow-shoe enables a man to walk over snow without sinking. In using it in blocks we depart from its legitimate application."

Witness considered that a more perfect foundation could be formed by concrete poured in as a whole than of bricks and cement. If called on to construct a wall in the water, of large masses of brick formed into a block with cement, or concrete formed into blocks, each block being 10 feet by 3 feet by 2 feet, would prefer the brick and cement. Had recently examined the river wall at Woolwich, constructed about eight years ago, and found that the lower part of it, to a height of four or five feet from the bottom, is perfectly sound on the face: for three or four feet above that it is injured. It appeared to him that the alternations of wet and dry, the frost acting upon it, had eroded the face of it two or three inches in depth; but behind that it is perfectly sound. With great force, he could hardly detach one of the pebbles from the broken places. Had watched the wall when in progress; and considered then that it was putting concrete to too severe a test.

Commander Carpenter gave some particulars of the breakwater at Algiers, now being constructed by the French of *blocks* of concrete, though stone is abundant in the neighbourhood. The blocks are made 14 feet long and 9 feet wide, and generally contain about thirty tons of concrete each. It is estimated to cost about a million sterling.

Sir Robert Smirke, architect, in a letter to the chairman said, "If it is proposed to make masses of concrete of the dimensions stated, and employ them as blocks of artificial stone to form a sea-wall, I cannot believe, as far as my experience enables me to judge, that concrete of lime and gravel so employed will be found to answer the purpose: I think it would fail.

Such masses, made of very hard bricks and cement, would certainly be durable, and bear great pressure, but they would probably be more expensive than stone."

We will only add at present, that *Mr. Corderoy* estimates the price of a cubic foot of brickwork in

Pure cement at	£1	4	3
Add floating and setting ...	0	5	0
	1	9	3

The price of one yard of concrete with one-twelfth of blue lias lime, and one-twelfth of puzzolana, with the setting, he calculates at 13s. 9½d., or less than half the cost of brickwork.

ARCHITECTURAL NOTES ON CONWAY CASTLE, &c.

THERE are few places in the kingdom, of equally diminutive extent, more interesting than the little town of Conway. The picturesque beauty of its situation, and the venerable aspect of its grey walls and towers, with the magnificent castle predominating over all, cannot but have left an impression on the mind of every traveller of taste who has been whirled along the great road from Chester to Holyhead. Strange to say, comparatively few tourists do more than give a cursory glance at the objects it presents to their notice, being anxious to hurry forward to the wilder and more stupendous scenery of the Snowdonian range, of which the mountains hereabouts are only outposts. A few days' ramble, however, in the neighbourhood, would amply reward the researches of the botanist, the geologist, the antiquary, or the mere lover of the picturesque. The writer of these notes (though, properly speaking, he has no claim to take high rank in any of these classes) could not refrain, during some weeks rustication recently within a few miles of Conway, from making a few pen and pencil memoranda in each department. The present remarks will of course be confined to those objects which fall more immediately within the province of THE BUILDER.

In some respects the town of Conway is unique, in this kingdom at least, as a remnant of antiquity. Could we imagine a *fossil* town of the thirteenth century, disinterred from the dust and slumber of ages, as Pompeii and Herculaneum have been, with the *enceinte* of its walls perfect, its watch-towers standing in their original integrity, its gates of entrance undisturbed, its castle remaining for the most part as in the days of the first Edward—just such a town would be idealized as Conway now presents itself to us in bodily shape. Here are also other sources of interest to a reflective mind, illustrating by strong and even startling contrasts the progress of civilization in our land, as exhibited in the architectural and engineering works of successive periods of our history. On the summit of a high hill overlooking the town, lie the remains of the ancient city, or fortress, of Caerleon, evidently the work of a people little, if at all, more advanced in art than the aborigines of New Zealand. The castle and walls of the town present a lively picture of the middle ages.

The elegant suspension-bridge, lightly spanning the river with its lace-like meshes, and the works on Telford's line of road illustrate the advances of modern society; whilst the railway now in progress, pushing its embankment half way across the river, boring through the old walls and tunnelling under the town, points with prophetic finger along the opening vista of the future. Though Conway Castle and walls be the especial subject of this paper, yet a cursory glance may be permitted at the more ancient as well as the more modern objects of interest just referred to.

The remains of the city of Caerleon occupy the summit of a rocky and precipitous ridge, about a mile and a half from Conway, overlooking the sea on one side, and on the other, commanding rather an extensive prospect over an undulating country landward. The top of the mountain is encircled by an *agger* or rampart of rough unhewn stones, which is still of great thickness, and has probably been of considerable height. The stones shew no appearance of having been *built* in the manner of masonry of even the rudest construction, but have evidently been piled up in the manner of a mound. The line of wall, particularly on the landward side, shews some skill in choosing the best points of defence. At the western end, there is a separate enclosure of an irregular form about 100 yards by 30, with a similar rough rampart surrounding it. The area of the larger inclosure is covered, wherever the rugged nature of the site affords level space, with structures of a circular form, varying in diameter from 18 feet to about 30 feet. They are built with rough stones without any cement, and in general have one aperture for access. The ruins do not stand at present more than a foot above the green sward, so that whether they were originally conical buildings roofed with stone, or merely the foundation was of stone and the superstructure of lighter material it is now impossible to ascertain. The curve of the circle is in all cases well formed, but no regularity is observable in the position of the buildings, being placed without regard to order wherever a locality offered itself. That these buildings, whatever was their construction, were dwellings, there is little reason to doubt. It is a singular fact, that in all countries, in the earlier and ruder states of society, the habitations of the people have been of a circular form. The wigwam of the Indian, the hut of the South Sea Islanders, are circular in plan. The huts of the ancient Italians, as depicted on vases of the most remote antiquity, were also circular. Whether this similarity arises from the greater simplicity of construction in this form operating independently in each case, or whether it is indicative of a common original we cannot now discuss.

The remains of the dwellings of Caerleon are called by the tradition of the country "*Cyttian Gwyddelod*," or the houses of the Irish. Does this tradition point to the Scoto-Irish immigration from the west, of which there are traces more or less distinct, not only in Scotland, but in other parts of the island? However this may be, there is no question of their very remote antiquity, and they are interesting as affording traces, faint though they be, of the very earliest inhabitants of the country.

Conway Castle, it is scarcely necessary to state, was erected by Edward I. in the year 1284, at the period of the final subjugation of the principality, at which time also the fortifications of the town were constructed. The place appears to have been subjected to extremely few vicissitudes. Although it sustained a siege and capture in the civil wars, it escaped the fate which befel so many noble structures, that of being blown up with gunpowder. Had it not been for the vandalism of the Earl of Conway, who obtained a grant of the castle from the first and second Charles, it might have remained to this day unscathed. This worthy, in the year 1665, for the paltry value of the lead and timber, completely gutted the entire edifice, and left it much as it now stands. At present the roofs and floors are gone, and the staircases broken down for the most part, but in other respects the building remains in its pristine integrity.

Though not as extensive as Caernarvon, Caerphilly, Ragland, and some others, Conway is still a noble specimen of the Plantagenet or Edwardian castle. It stands on a bold precipitous rock, at an angle formed by the junction of the small river Cyffin with the Conway river. The rock on which it is situated is composed of argillaceous schist alternating with limestone, with veins of quartz interfused. The strata are thrown up at an angle of 45° to 60° with the horizon.

The plan of the castle is a parallelogram, or oblong square, somewhat curved on the south side, to accommodate the building to the form of the site. At the four corners, and at equal distances along the two longer sides, rise eight circular towers, about forty feet in external diameter. Internally, the inclosure is divided into two unequal portions, forming the outer and inner "baileys," by a strong embattled wall. The entrance is at the west end, between two massive towers, connected by a curtain wall thirteen feet thick. The archway is furnished with a portcullis, and the wall between the towers is crowned with machicolations projecting about four feet from the wall. This entrance opens on a terrace raised considerably above the ground outside the castle, and protected by a wall flanked by five turrets. The outer entrance is not opposite the inner one, but is placed laterally at one end of the terrace, with external barbican, drawbridge, gateway with portcullis, and another gateway with hanging doors.

Entering through the gateway into the outer court, we have on the right the great hall, about 130 feet by 32 feet. This is rather singular in its plan, being curved in form to correspond with the curve in the outer wall. It is carried up in one story the full height of the building, and one half, divided longitudinally, has had a basement story. The construction of the roof has been somewhat remarkable. In place of the complicated and beautiful wood trusses which usually span the walls of similar apartments, there are eight stone-pointed arch ribs, of low two-centred shape, rising about half their span, which have supported the purlins and covering of the roof. The effect is simple and bold, but with walls of less thickness than 12 feet, as these are, the result of the lateral thrust might be disastrous. The east end of the hall has a semicircular-headed window, which has been filled in with decorated tracery, nearly the whole of which has disappeared. Looking on the court are three windows with equilateral pointed heads, which have had tracery of similar character. On the external side are six narrow square-headed windows, with transoms. The recesses of all the windows, which are about 8 feet in depth, are furnished with stone benches round. From one of these recesses a door opens into the spiral staircase of one of the towers (called the Prisoners' Tower). The only other entrance is by a door with pointed head opening from the court. The hall has three fireplaces, one at the west end, and two on the north side, next the court. The fireplaces throughout the castle are curious and interesting in their character. Like all the rest of the work, the masonry of them is excellent. The jambs are

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